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SIX-INCH TRANSIT CIRCLE OBSERVATIONS OF THE SUN, MOON, AND PLANETS

UNITED STATES NAVAL OBSERVATORY

C I R C U L A R N O. 1 1 5

U. S. Naval Observatory, Washington, D. C. 20390

February 1, 1967

OBSERVATIONS OF THE SUN, MOON, AND PLANETS
SIX-INCH TRANSIT CIRCLE RESULTS

by

A. N. Adams and D. K. Scott

This *Circular* contains positions of the sun, moon, and planets observed with the Six-Inch Transit Circle between 11 January, 1965 and 11 April, 1966. These results are provisional. Definitive results will be published later in a volume of *Publications of the U. S. Naval Observatory*.

These results are a continuation of those published in *U. S. Naval Observatory Circular* No. 108. These include all observations made on circle position 1 in the current observing program.

The observed positions are geocentric and have received the usual corrections for instrumental errors, refraction, diurnal aberration, parallax, and orbital motion. The right ascensions were reduced, differentially, to the FK4 system by means of the FK4 stars used to determine the clock correction.

The declinations of the night objects have been reduced to the FK4 system by applying a correction derived from the same stars that were used for the clock correction.

The sun, Mercury, and Venus were reduced with the clock correction of the nearest night tour and the nadirs taken at the time of the observation. Corrections for day minus night differences are not available at this time.

Observations of Mercury and Venus were made on the illuminated limb or on the center of light as indicated, and reduced with the appropriate corrections to the center of the planet. Observations of the sun, Mars, Jupiter, and Saturn were made on both pairs of limbs; those of Mars and Jupiter have been corrected for defective illumination. The tabular semidiameters from the ephemeris have been used whenever a correction from limb to center or a correction for defective illumination has been applied. The moon observations were made on the illuminated limbs as

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indicated and have been reduced with the tabular values of the semidiameter corrected for irradiation (*Pub. U. S. Naval Observatory*, XVI, 378) and with limb corrections from the charts of C. B. Watts (*Astro. Papers*, Vol. 17).

The computed positions with which the observed positions are compared were derived from the tabular values of the *American Ephemeris* for the instant when the ephemeris hour angle is zero on the meridian $5^{\text{h}} 8^{\text{m}} 15^{\text{s}} 849$ west longitude. No correction has been made for the difference between Ephemeris and Universal Time. The Julian Ephemeris Dates refer to the computed times of transit. The distances, in astronomical units, are those interpolated from the *American Ephemeris* at the computed time of transit. Brown's lunation numbers have been indicated for the moon.

The observers are identified as follows:

0, P. D. Hemenway; 1, F. S. Gauss; 2, W. T. Toland; 3, F. J. Giovane; 4, B. L. Klock;

5, A. N. Adams; 6, D. K. Scott; 7, H. E. Durgin; 8, R. W. Rhynsbarger; 9, J. R. Sievers.

The values of ΔT from the moon observations (lunation means) are listed in Table 1. The mean value of ΔT for 1965 is $34^{\text{s}} 45 (\pm 0^{\text{s}} 16)$.

ΔT is computed by dividing (O-C) by 1.002738 times the variation per hour of longitude. The weights in right ascension are proportional to the square of $15 \cos \delta$ times the variation in right ascension per hour of longitude; those in declination are proportional to the square of the variation in declination per hour of longitude.

In order to convert from the equinox of FK4 to that of Newcomb, it is necessary to add $+1^{\text{s}} 34$ to the values of ΔT tabulated in this circular.

TABLE I

Lun.	ΔT s	P.E. s	Lun.	ΔT s	P.E. s
520	34.35	0.29	528	33.42	0.45
521	36.19	0.16	529	33.41	0.59
522	33.52	0.27	530	34.33	0.29
523	35.06	0.33	531	34.10	0.47
524	35.55	0.34	532	35.23	0.48
525	34.08	0.98	534	35.35	0.41
526	34.79	0.63	535	35.53	0.27
527	34.54	0.25			

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SUN

Date	J.E.D.	O L	Obs. R.A.	(O-C)	L Obs.	Decl.	(O-C)	Distance
243								
			h m s	s	° ' "	° ' "	"	
65 01 11.71	8772.21968	6	19 32 04.498	+0.122	-21 45 30.39	-0.53		0.983483
65 01 14.72	8775.22046	8	19 45 02.014	+0.132	-21 15 04.19	+0.45		0.983624
65 01 19.72	8780.22161	4	20 06 24.193	+0.128	-20 16 16.30	+1.86		0.983985
65 01 21.72	8782.22201	8	20 14 51.959	+0.100	-19 50 04.39	+1.03		0.984174
65 01 22.72	8783.22219	1	20 19 04.745	+0.110	-19 36 24.07	+1.54		0.984277
65 01 27.72	8788.22300	1	20 39 57.039	+0.035	-18 22 45.40	+0.74		0.984865
65 01 28.72	8789.22313	4	20 44 05.193	+0.077	-18 06 58.71	+2.06		0.984994
65 02 04.72	8796.22380	1	21 12 39.117	+0.004	-16 07 57.80	+0.59		0.986000
65 02 06.72	8798.22391	6	21 20 41.517	+0.114	-15 31 20.24	+1.19		0.986315
65 02 15.72	8807.22392	8	21 56 11.955	+0.018	-12 34 20.47	+0.74		0.987932
65 02 16.72	8808.22388	1	22 00 04.868	+0.024	-12 13 33.69	+1.85		0.988136
65 02 17.72	8809.22383	4	22 03 57.096	+0.052	-11 52 37.49	+0.75		0.988345
65 02 18.72	8810.22377	8	22 07 48.612	+0.063	-11 31 29.15	+0.51		0.988558
65 02 20.72	8812.22363	6	22 15 29.655	+0.082	-10 48 38.03	+2.12		0.988999
65 02 23.72	8815.22337	4	22 26 56.413	+0.034	-9 43 10.18	+0.77		0.989688
65 02 27.72	8819.22292	6	22 42 03.988	+0.063	-8 13 48.04	+1.04		0.990646
65 03 11.72	8831.22104	2	23 26 39.718	+0.087	-3 35 47.64	+1.12		0.993672
65 03 12.72	8832.22086	1	23 30 20.071	+0.023	-3 12 14.03	-0.61		0.993934
65 03 13.72	8833.22067	6	23 34 00.225	+0.074	-2 48 35.11	+0.98		0.994200
65 03 19.71	8839.21947	2	23 55 55.707	+0.102	-0 26 26.87	+1.94		0.995844
65 03 23.71	8843.21863	4	0 10 29.575	+0.064	+1 08 13.58	+0.28		0.996989
65 03 27.71	8847.21779	6	0 25 02.699	+0.055	+2 42 27.53	-0.21		0.998152
65 03 31.71	8851.21695	4	0 39 36.216	+0.010	+4 15 51.60	-0.02		0.999313
65 04 01.71	8852.21674	8	0 43 14.878	+0.078	+4 39 02.59	+0.68		0.999602
65 04 05.71	8856.21593	2	0 57 50.464	-0.031	+6 10 51.06	+1.24		1.000739
65 04 08.71	8859.21534	4	1 08 49.133	+0.060	+7 18 35.34	+1.00		1.001580
65 04 10.71	8861.21496	6	1 16 09.212	+0.001	+8 03 07.76	+0.80		1.002136
65 04 13.71	8864.21441	1	1 27		+9 08 53.58	+0.51		1.002970
65 04 14.71	8865.21424	2	1 30 52.677	-0.054	+9 30 30.70	+0.20		1.003248
65 04 16.71	8867.21390	2	1 38 16.442	+0.002	+10 13 16.05	-0.48		1.003805
65 04 17.71	8868.21373	6	1 41 58.924	+0.075	+10 34 25.04	+0.49		1.004085
65 04 20.71	8871.21327	4	1 53 08.468	-0.056	+11 36 45.12	+0.15		1.004921
65 04 21.71	8872.21313	3	1 56 52.589	-0.025	+11 57			1.005199
65 05 03.71	8884.21185	8	2 42 20.315	+0.034	+15 45 18.78	+0.17		1.008359
65 05 04.71	8885.21178	2	2 46 10.974	-0.063	+16 02 46.74	+1.24		1.008600
65 05 11.71	8892.21149	1	3 13 21.648	+0.026	+17 57 06.70	-0.41		1.010202
65 05 13.71	8894.21146	2	3 21 12.522	+0.011	+18 27 08.07	-0.44		1.010638
65 05 14.71	8895.21146	3	3 25 08.806	+0.009	+18 41 41.85	+0.48		1.010853
65 05 15.71	8896.21146	6	3 29 05.754	+0.094	+18 55 56.13	+0.85		1.011066
65 05 18.71	8899.21151	1	3 40 59.691	+0.018	+19 36 41.93	+0.86		1.011694
65 05 19.71	8900.21154	6	3 44 58.823	+0.014	+19 49 36.47	-0.32		1.011898
65 05 25.71	8906.21186	4	4 09 05.197	+0.032	+20 59 58.99	+0.35		1.013063
65 05 27.71	8908.21201	8	4 17 11.557	+0.081	+21 20 35.43	+0.04		1.013419
65 05 28.71	8909.21209	2	4 21 15.440	+0.070	+21 30 20.65	+0.01		1.013591
65 05 31.71	8912.21238	3	4 33 29.747	-0.064	+21 57 22.31	+0.46		1.014072
65 06 02.71	8914.21259	8	4 41 41.649	+0.132	+22 13 27.22	-1.05		1.014365
65 06 04.71	8916.21282	1	4 49 54.713	+0.043	+22 28 02.02	+0.54		1.014636
65 06 05.71	8917.21295	6	4 54 01.847	+0.107	+22 34 43.42	+0.69		1.014764
65 06 06.71	8918.21307	3	4 58 09.202	+0.091	+22 40 59.52	-0.55		1.014888
65 06 07.71	8919.21320	4	5 02 16.764	+0.008	+22 46 53.44	-0.04		1.015008
65 06 11.71	8923.21374	2	5 18 49.867	+0.056	+23 06 24.96	-0.52		1.015450
65 06 18.71	8930.21476	2	5 47		+23 24 53.82	-0.63		1.016093
65 06 20.71	8932.21506	3	5 56 13.660	+0.125	+23 26 28.17	-0.90		1.016245
65 06 21.71	8933.21521	4	6 00 23.253	+0.091	+23 26 39.06	-0.18		1.016314
65 06 23.71	8935.21551	4	6 08 42.464	+0.112	+23 25 45.88	+0.73		1.016439

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Date	J.E.D.	O L	Obs. R.A.	(O-C)	L Obs.	Decl.	(O-C)	Distance
	243		h m s	s		° ' "	° ' "	
65 06 25.71	8937.21581	2	6 17 01.389	+0.085	+23 23 11.08	-0.93	1.016544	
65 07 08.71	8950.21752	3	7 10 44.221	+0.018	+22 26 56.39	+0.44	1.016649	
65 07 09.71	8951.21762	0	7 14 49.753	+0.004	+22 19 48.76	-0.64	1.016622	
65 07 16.71	8958.21820	1	7 43 15.950	+0.115	+21 19 27.97	-0.24	1.016329	
65 07 19.71	8961.21836	3	7 55 19.629	+0.062	+20 48 05.55	-1.20	1.016149	
65 07 21.71	8963.21844	1	8 03 19.447	+0.049	+20 25 26.99	+0.18	1.016009	
65 07 26.71	8968.21852	3	8 23 09.483	+0.199	+19 22 49.88	-0.81	1.015574	
65 07 27.71	8969.21852	9	8 27 05.551	+0.022	+19 09 19.32	-1.18	1.015469	
65 08 04.71	8977.21823	4	8 58 13.454	+0.125	+17 10 18.63	-0.61	1.014433	
65 08 06.71	8979.21809	1	9 05 54.144	+0.092	+16 37 40.67	-0.88	1.014127	
65 08 10.71	8983.21772	3	9 21 08.391	+0.146	+15 29 15.72	-0.96	1.013476	
65 08 12.71	8985.21750	3	9 28 41.875	+0.031	+14 53 33.27	-0.91	1.013133	
65 08 16.71	8989.21697	4	9 43 42.544	+0.101	+13 39 20.32	-0.83	1.012415	
65 08 17.71	8990.21682	9	9 47 26.395	+0.102	+13 20 12.96	-1.52	1.012229	
65 08 18.71	8991.21667	1	9 51 09.761	+0.108	+13 00 54.25	-0.93	1.012041	
65 08 29.71	9002.21466	3	10 31 37.698	+0.062	+ 9 15 49.46	-0.59	1.009709	
65 08 30.71	9003.21445	7	10 35 16.045	+0.054	+ 8 54		1.009471	
65 09 01.71	9005.21402	1	10 42 31.788	+0.097	+ 8 11 00.77	-1.71	1.008985	
65 09 02.71	9006.21380	2	10 46 09.109	+0.034	+ 7 49 08.35	-2.28	1.008737	
65 09 03.71	9007.21357	7	10 49		+ 7 27 10.65	-0.59	1.008485	
65 09 07.71	9011.21264	1	11 04 12.005	+0.059	+ 5 58		1.007463	
65 09 09.71	9013.21217	7	11 11		+ 5 12 55.24	-1.22	1.006944	
65 09 10.71	9014.21192	4	11 14 59.206	+0.048	+ 4 50 12.77	-1.08	1.006683	
65 09 16.71	9020.21045	4	11 36 30.722	+0.060	+ 2 32 23.78	-1.60	1.005101	
65 09 18.70	9022.20995	9	11 43 41.071	+0.094	+ 1 46 00.67	-0.30	1.004566	
65 10 05.70	9039.20601	4	12 45 00.538	+0.024	- 4 50 14.77	-0.94	0.999728	
65 10 06.70	9040.20580	8	12 48 39.319	+0.049	- 5 13 16.28	+0.23	0.999436	
65 10 08.70	9042.20541	2	12 55 58.049	+0.115	- 5 59 09.99	-0.62	0.998854	
65 10 18.70	9052.20376	2	13 33 00.652	+0.081	- 9 42 54.81	-0.53	0.996044	
65 10 19.70	9053.20363	9	13 36 46.161	+0.140	-10 04 37.83	-0.58	0.995771	
65 10 20.70	9054.20351	3	13 40 32.177	+0.056	-10 26 11.23	+0.17	0.995498	
65 10 26.70	9060.20295	3	14 03 23.169	+0.112	-12 32 11.11	-0.75	0.993864	
65 10 28.70	9062.20283	9	14 11 05.830	+0.048	-13 12 41.33	+0.04	0.993322	
65 10 29.70	9063.20278	2	14 14 58.374	+0.118	-13 32 38.70	-0.31	0.993053	
65 10 30.70	9064.20274	8	14 18 51.563	+0.072	-13 52 21.41	+0.99	0.992785	
65 11 01.70	9066.20269	9	14 26 40.376	+0.107	-14 31 09.69	+0.45	0.992254	
65 11 02.70	9067.20268	2	14 30 35.925	+0.094	-14 50 13.29	-0.30	0.991992	
65 11 03.70	9068.20268	7	14 34		-15 08 59.95	+1.35	0.991733	
65 11 05.70	9070.20270	8	14 42 27.420	+0.102	-15 45 52.38	+0.23	0.991225	
65 11 07.70	9072.20276	3	14 50 25.823	+0.105	-16 21 41.13	-0.24	0.990729	
65 11 14.70	9079.20329	3	15 18 47.082	+0.158	-18 18 01.10	-0.63	0.989126	
65 11 15.70	9080.20340	2	15 22 53.560	+0.152	-18 33 22.47	+1.58	0.988914	
65 11 23.70	9088.20467	2	15 56 15.953	+0.141	-20 24 16.23	-0.60	0.987318	
65 11 26.70	9091.20530	2	16 09 00.039	+0.067	-20 59 46.56	+0.54	0.986760	
65 11 28.70	9093.20576	3	16 17 33.175	+0.116	-21 21 29.74	+0.53	0.986405	
65 11 30.70	9095.20625	4	16 26 09.008	+0.129	-21 41 35.81	+0.36	0.986063	
65 12 02.70	9097.20678	2	16 34 47.348	+0.075	-22 00 00.51	+1.87	0.985737	
65 12 08.70	9103.20850	9	17 00 56.299	+0.134	-22 45 02.19	-0.48	0.984881	
65 12 09.70	9104.20881	2	17 05 19.529	+0.106	-22 50 59.29	-0.32	0.984759	
65 12 20.71	9115.21246	7	17 53 58.165	+0.057	-23 26 13.48	+1.62	0.983775	
65 12 22.71	9117.21316	4	18 02 51.496	+0.147	-23 26 34.75	+0.78	0.983652	
65 12 28.71	9123.21523	3	18 29 30.221	+0.107	-23 16 17.00	+1.11	0.983377	
65 12 29.71	9124.21557	7	18 33 56.154	+0.119	-23 12 55.30	+1.38	0.983347	
66 01 04.71	9130.21753	9	19 00		-22 43 03.66	+1.90	0.983270	
66 01 08.71	9134.21874	3	19 17 56.910	+0.143	-22 14 08.74	+0.61	0.983342	

SUN

Date	J.E.D.	O	L	Obs.	R.A.	(O-C)	L	Obs.	Decl.	(O-C)	Distance
	243			h m s	s			° ' "	"		
66 01 09.71	9135.21903	3		19 22	18.519	+1.30		-22 05	47.50	+1.89	0.983377
66 01 11.71	9137.21959	2		19 31	00.075	+0.64		-21 47	51.51	+0.46	0.983465
66 01 12.71	9138.21986	3		19 35	20.058	+0.87		-21 38			0.983517
66 01 14.72	9140.22038	7		19 43	58.193	+1.13		-21 17	44.54	+1.09	0.983638
66 01 17.72	9143.22111	2		19 56	50.538	+1.02		-20 43	56.84	+0.98	0.983855
66 01 18.72	9144.22133	7		20 01	06.651	+1.31		-20 31	52.36	+1.74	0.983936
66 01 19.72	9145.22155	2		20 05	21.967	+0.71		-20 19	26.58	+0.49	0.984020
66 02 06.72	9163.22388	3		21 19	42.414	+0.95		-15 35	54.41	+1.26	0.986225
66 02 14.72	9171.22395	7		21 51	20.833	+1.10		-12 59	58.18	+0.45	0.987720
66 02 17.72	9174.22384	3		22 03	00.501	+0.19		-11 57	48.12	+0.40	0.988341
66 02 20.72	9177.22365	9		22 14	33.982	-0.05		-10 53			0.988984
66 02 21.72	9178.22358	2		22 18	23.881	+0.68		-10 32	16.23	+0.68	0.989202
66 02 23.72	9180.22340	9		22 26				-9 48	29.10	+1.90	0.989645
66 02 26.72	9183.22308	9		22 37	23.587	+1.04		-8 41	44.81	+1.61	0.990325
66 03 08.72	9193.22161	2		23 14	42.040	+0.62		-4 52	01.38	+2.00	0.992780
66 03 10.72	9195.22126	8		23 22	04.536	+0.19		-4 05			0.993314
66 03 12.72	9197.22089	9		23 29	25.931	+1.41		-3 18			0.993858
66 03 17.71	9202.21992	4		23 47	44.566	+0.84		-1 19	40.72	+1.34	0.995252
66 03 18.71	9203.21972	7		23 51	23.652	+0.56		-0 55			0.995533
66 03 21.71	9206.21910	9		0 02	19.990	-0.33		+0 15	10.91	+0.50	0.996379
66 03 22.71	9207.21890	9		0 05	58.618	+0.23		+0 38	52.45	+0.58	0.996660
66 03 23.71	9208.21869	4		0 09	37.149	+0.85		+1 02	33.42	+1.42	0.996941
66 03 25.71	9210.21827	2		0 16	53.866	+0.44		+1 49			0.997502
66 03 29.71	9214.21743	7		0 31	27.068	+0.63		+3 23	44.08	+1.25	0.998621
66 04 08.71	9224.21538	7		1 07	55.293	+0.42		+7 13			1.001463

MERCURY

65 01 11.65	8772.15067	6	C	17 52	26.486	+1.74	C	-22 14	13.02	+1.22	1.075683
65 01 21.66	8782.16232	8	C	18 48	40.771	+2.43	C	-23 12	09.05	-0.57	1.227530
65 01 28.67	8789.17376	4	C	19 32	47.679	+1.99	C	-22 47	23.71	+1.21	1.303855
65 02 06.69	8798.19036	6	C	20 32	14.840	+1.43	C	-20 41	54.27	+1.37	1.368256
65 02 15.70	8807.20807	8	C	21 33	18.817	+1.58	C	-16 44	09.86	+0.17	1.393853
65 02 18.71	8810.21415	8	C	21 53	54.750	+1.35	C	-14 59	23.94	+1.85	1.392526
65 03 11.75	8831.25631	2	C	0 17	35.548	+1.96	C	+2 09	45.68	+1.75	1.163371
65 03 13.75	8833.25930	6	C	0 29	47.178	+0.67	C	+3 55	45.33	+1.73	1.115911
65 05 13.64	8894.14581	2	C	1 46	24.529	+1.41	C	+7 41	46.18	+1.51	0.946496
65 05 15.64	8896.14725	6	C	1 56	22.247	+1.30	C	+8 43	00.30	+0.95	0.980113
65 05 18.65	8899.15021	1	C	2 12	28.654	+1.97	C	+10 22	28.22	+1.87	1.031006
65 05 28.66	8909.16760	2	C	3 17	00.517	+1.28	C	+16 34	54.19	+0.65	1.195557
65 06 04.68	8916.18754	1	C	4 13	24.547	+2.18	C	+20 50	47.92	+0.87	1.285304
65 06 05.69	8917.19092	6	C	4 22	13.887	+2.50	C	+21 23	19.92	+0.43	1.294509
65 06 07.69	8919.19802	4	C	4 40	22.059	+1.92	C	+22 23	23.39	-0.65	1.309299
65 06 21.75	8933.25106	4	C	6 52	09.202	+1.50	C	+24 47	09.18	-1.85	1.261436
65 06 25.76	8937.26364	2	C	7 26	04.820	+1.50	C	+23 55	51.39	-0.64	1.210514
65 09 02.66	9006.16589	2	C	9 36	58.517	+0.41	C	+14 15	38.39	-0.40	0.942617
65 09 10.67	9014.17582	4	C	10 22	51.647	+1.81		+11 41			1.156046
65 10 05.72	9039.22229	4	C	13 08	30.965	+1.03	C	-6 39	23.84	-1.69	1.415168
65 10 18.74	9052.24017	2	C	14 25	35.339	+3.10	C	-15 23	21.11	+0.77	1.365321
65 10 29.75	9063.25426	2	C	15 29	18.328	+1.13	C	-21 02	15.72	-1.62	1.256749
65 10 30.75	9064.25549	8	C	15 35	01.312	+1.59	C	-21 27	10.11	+0.20	1.243805
65 12 28.65	9123.15305	3	C	16 59	43.224	+2.04	C	-21 29	17.12	-0.90	1.147342
66 01 11.67	9137.17403	2	C	18 25	12.555	+1.32	C	-23 54	12.06	+1.79	1.332482

MERCURY

Date	J.E.D.	O	L	Obs.	R.A.	(O-C)	L	Obs.	Decl.	(O-C)	Distance
	243			h	m	s		°	'	"	
66 02 14.74	9171.24375	7	C	22	19	55.771		-12	07		1.325087
66 02 17.74	9174.24976	3	C	22	40	26.100		C - 9	46	45.03	1.283281
66 02 21.75	9178.25713	2	C	23	06	51.170		C - 6	26	44.24	1.211682
66 02 23.76	9180.26036	9	C	23	19	23.525		C - 4	44	06.14	1.168892
66 03 08.76	9193.26268	2	C	0	13	59.980		C + 4	18	23.59	0.824329

VENUS

65 01 11.65	8772.15335	6	2	17	56	18.413		S -22	56	54.96	+0.77	1.534745
65 01 14.65	8775.15646	8	2	18	12	37.480		-23	03			1.546189
65 01 19.66	8780.16166	4	2	18	39	50.280		N -22	59	10.49	+1.36	1.564555
65 01 21.66	8782.16372	8	2	18	50	42.627		N -22	52	41.74	+0.68	1.571651
65 01 28.67	8789.17082	4	2	19	28	33.129		N -22	08	00.82	+0.65	1.595324
65 02 04.67	8796.17753	1	2	20	05	50.649		N -20	50	24.71	+1.52	1.617136
65 02 06.67	8798.17936	6	2	20	16	21.840		N -20	22	32.32	+1.00	1.623025
65 02 15.68	8807.18694	8	2	21	02	47.761		N -17	48	23.37	+1.13	1.647676
65 02 18.68	8810.18923	8	2	21	17	55.789		N -16	47	28.47	+1.28	1.655231
65 02 23.69	8815.19277	4	2	21	42	45.707		N -14	56	40.63	-0.80	1.667067
65 02 27.69	8819.19538	6	2	22	02	17.482		N -13	20	27.95	+1.48	1.675828
65 03 13.70	8833.20305	6	2	23	08	34.182		N - 7	03	25.28	+0.73	1.701299
65 05 03.72	8884.22783	8	1	3	05	25.326		S +16	55	09.76	+0.52	1.718623
65 05 04.72	8885.22852	2	1	3	10	20.963		S +17	17	24.87	-0.77	1.717619
65 05 11.73	8892.23365	1	1	3	45	21.263		S +19	40	09.32	+0.08	1.709001
65 05 13.73	8894.23523	2	1	3	55	31.271		S +20	16	20.90	+0.41	1.706032
65 05 15.73	8896.23686	6	1	4	05	45.823		S +20	50	20.06	+0.62	1.702837
65 05 19.74	8900.24026	6			4	26		S +21	51	21.47	+0.79	1.695772
65 05 25.74	8906.24570	4	1	4	57	57.486		S +23	04	21.66	+0.47	1.683460
65 06 02.75	8914.25341	8	1	5	40	38.072		S +24	04	23.69	-0.19	1.663771
65 06 04.75	8916.25539	1	1	5	51	22.629			+24	12		1.658255
65 06 05.75	8917.25638	6			5	56		S +24	15	22.09	-0.03	1.655410
65 06 06.75	8918.25738	3	1	6	02	08.028		S +24	17	35.16	-0.55	1.652507
65 06 18.76	8930.26919	2	1	7	06	29.720		N +23	48	15.57	-2.27	1.613266
65 06 21.77	8933.27202	4	1	7	22	24.908		N +23	25	01.43	-1.72	1.602222
65 07 19.79	8961.29315	3	1	9	43	19.265			+15	22		1.476546
65 07 26.79	8968.29668	3	1	10	16	00.885		N +12	23	37.50	-1.11	1.439429
65 08 03.79	8976.29997	9	1	10	52	18.016		N + 8	40	03.87	-1.76	1.394525
65 08 05.80	8978.30068	9	1	11	01	12.882		N + 7	41	45.08	-1.64	1.382907
65 08 06.80	8979.30102	1	1	11	05	39.300		N + 7	12	18.65	-0.72	1.377044
65 08 12.80	8985.30291	3	1	11	32	02.018		N + 4	12	08.01	-1.24	1.341134
65 08 29.80	9002.30739	3	1	12	45	31.371		N - 4	32	39.61	-0.08	1.233403
65 08 30.80	9003.30765	7	1	12	49	50.252		N - 5	03	24.57	-1.50	1.226810
65 09 02.80	9006.30843	2	1	13	02	47.718		N - 6	35	00.34	-1.03	1.206872
65 09 08.81	9012.31009	9	1	13	28	51.132		N - 9	34	34.60	-1.22	1.166335
65 09 09.81	9013.31039	7	1	13	33	13.173		N -10	03	54.24	-1.48	1.159500
65 09 10.81	9014.31069	4	1	13	37	35.665		N -10	33	00.57	-0.76	1.152644
65 09 16.81	9020.31263	4	1	14	04	03.362		N -13	22	47.96	-0.04	1.111093
65 09 18.81	9022.31334	9	1	14	12	58.136		N -14	17	17.08	-1.39	1.097094
65 10 05.82	9039.32093	4	1	15	30	57.302		N -21	01	32.90	+1.81	0.975242
65 10 14.82	9048.32604	8	1	16	13	49.112		N -23	40	48.76	+0.27	0.908979
65 10 18.82	9052.32849	2	1	16	33	07.574		N -24	36	48.46	+0.99	0.879255
65 10 19.82	9053.32912	9	1	16	37	58.297		N -24	49	18.81	+0.01	0.871802
65 10 20.82	9054.32975	3	1	16	42	49.199		N -25	01	10.25	+0.95	0.864339
65 10 27.83	9061.33418	7	1	17	16	48.957		N -26	06	31.52	-0.09	0.811846

VENUS

Date	J.E.D.	O	L	Obs.	R.A.	(O-C)	L	Obs.	Decl.	(O-C)	Distance
	243			h m s	s			° ' "	"		
65 10 28.83	9062.33481	8	1	17 21	39.896	+0.062	N -26	13	16.14	-0.05	0.804313
65 10 29.83	9063.33543	2	1	17 26	30.483	+0.080	N -26	19	21.35	-0.03	0.796772
65 10 30.83	9064.33605	8	1	17 31	20.563	+0.039	N -26	24	45.40	+1.61	0.789224
65 11 01.83	9066.33726	9	1	17 40	59.141	+0.122	N -26	33	39.18	+0.48	0.774110
65 11 03.83	9068.33845	7	1	17 50	34.640	+0.070	N -26	39	52.50	+1.39	0.758974
65 11 05.83	9070.33959	8	1	18 00	06.446	+0.048	N -26	43	29.87	+0.40	0.743821
65 11 18.84	9083.34532	8	1	18 59	38.679	-0.033	S -26	05	01.06	+1.21	0.645365
65 11 29.84	9094.34658	8	1	19 44	50.207	+0.057	S -24	17	48.54	+0.48	0.562878
65 12 01.84	9096.34632	3	1	19 52	20.025	+0.084	S -23	52	16.78	+0.41	0.548054
65 12 09.84	9104.34330	2	1	20 19	30.759	-0.108	S -21	56	01.73	+0.75	0.489723
65 12 22.83	9117.33003	4	1	20 51	36.661	-0.111	S -18	19	10.53	-0.42	0.400707
65 12 27.82	9122.32138	8	1	20 58	50.345	-0.190	S -16	55	06.71	+0.69	0.369554
65 12 28.81	9123.31937	3	1	20 59	52.602	-0.152	S -16	38	44.16	+1.42	0.363610
66 01 04.80	9130.30234	9	1	21 02	52.504	-0.189	S -14	51	49.92	+0.67	0.325425
66 01 09.78	9135.28678	3	1	21 00	07.186	-0.261	S -13	47	31.86	-0.19	0.302788
66 01 11.77	9137.27975	2	1	20 57	51.290	-0.384	S -13	25	34.42	-2.41	0.295086
66 01 14.76	9140.26839	7	1	20 53	17.271	-0.360	S -12	57	08.58	-1.16	0.285190
66 01 17.75	9143.25617	2	1	20 47	27.752	-0.335	S -12	34	38.99	-1.31	0.277471
66 01 18.75	9144.25193	7	1	20 45	16.913	-0.349	S -12	28	31.79	-1.72	0.275415
66 01 19.74	9145.24762	2	1	20 43	00.111	-0.275	S -12	23	06.23	-1.83	0.273627
66 02 12.64	9169.14947	3	2	19 55	54.752	+0.003	S -13	00	58.84	+0.86	0.313895
66 02 17.63	9174.13569	3	2	19 55	43.115	-0.007	S -13	27	07.55	+0.39	0.339043
66 02 21.62	9178.12666	2	2	19 58	27.559	+0.028	N -13	46	01.59	-0.51	0.361818
66 03 10.60	9195.10381	8	2	20 32	28.946	+0.116	-14	13			0.476010
66 03 16.59	9201.09999	8	2	20 50	37.638	+0.100	-13	54			0.520494
66 03 17.59	9202.09950	4	2	20 53	51.883	+0.185	N -13	49	31.50	+1.44	0.528033
66 03 18.59	9203.09905	7		20 57			N -13	44	10.15	+0.60	0.535601
66 03 21.59	9206.09789	9	2	21 07	18.260	+0.031	N -13	25	06.46	+0.66	0.558469
66 03 22.59	9207.09756	2	2	21 10	46.648	+0.088	N -13	17	45.79	+1.24	0.566140
66 03 25.59	9210.09675	2	2	21 21	25.557	+0.156	N -12	52	50.05	+0.91	0.589277
66 03 28.59	9213.09614	8	2	21 32	22.606	+0.168	N -12	23	31.76	+2.28	0.612577
66 03 29.59	9214.09598	7	2	21 36	05.146	+0.163	N -12	12	50.83	+0.40	0.620375
66 04 06.59	9222.09527	2	2	22 06	36.155	+0.055	N -10	30	35.46	+0.93	0.683187
66 04 08.59	9224.09522	7	2	22 14	25.501	+0.178	N -10	00	35.67	+1.91	0.698969

MARS

65 01 21.37	8781.87715	2		11 56	54.614	+0.070	+ 3	59	47.98	-0.70	0.906225
65 01 22.37	8782.87466	8		11 57	15.661	+0.031	+ 3	59	16.08	-0.40	0.898075
65 01 26.36	8786.86442	8		11 58	14.642	+0.059	+ 3	59	50.22	-0.41	0.866298
65 01 28.35	8788.85912	1		11 58	28.268	+0.051	+ 4	01	47.09	-0.95	0.850954
65 02 01.34	8792.84813	2		11 58	22.378	+0.029	+ 4	09	08.26	-0.45	0.821511
65 02 04.33	8795.83954	4		11 57	48.070	+0.049	+ 4	17	41.78	+0.21	0.800644
65 02 05.33	8796.83661	1		11 57	30.791	+0.019	+ 4	21	06.85	-0.27	0.793941
65 02 16.30	8807.80217	8		11 51	09.137	-0.009	+ 5	16	54.38	-0.18	0.729835
65 02 20.28	8811.78867	2		11 47	25.834	-0.026	+ 5	44	34.81	-0.09	0.711478
65 02 23.27	8814.77824	6		11 44	11.331	-0.004	+ 6	07			0.699671
65 02 27.26	8818.76395	2		11 39	19.919	-0.011	+ 6	40	00.87	+0.01	0.686725
65 02 28.26	8819.76032	6		11 38	02.066	+0.019	+ 6	48	26.78	-0.29	0.684008
65 03 02.25	8821.75300	1		11 35	21.036	-0.063	+ 7	05	33.08	-0.34	0.679217
65 03 11.21	8830.71942	8		11 22	21.031	-0.066	+ 8	22	46.28	+0.27	0.668556
65 03 12.21	8831.71567	2		11 20	52.007	-0.057	+ 8	31	00.35	+0.20	0.668482
65 03 13.21	8832.71191	1		11 19	23.113	-0.067	+ 8	39	06.74	+0.32	0.668628
65 03 14.20	8833.70816	6		11 17	54.550	-0.032	+ 8	47	04.16	+0.37	0.668993
65 03 16.20	8835.70067	2		11 14	58.787	-0.142	+ 9	02	28.64	+0.17	0.670373
65 03 17.19	8836.69694	8		11 13	32.115	-0.062	+ 9	09	54.18	+0.03	0.671385
65 03 23.17	8842.67483	8		11 05	15.869	-0.105	+ 9	49	47.71	+0.39	0.681829

MARS

Date	J.E.D.	O	L	Obs.	R.A.	(O-C)	L	Obs.	Decl.	(O-C)	Distance
	243			h	m	s		°	'	"	
65 03 28.15	8847.65694	6		10 59	09.046	-.132	+10 15	50.38	+0.69		0.695988
65 04 05.12	8855.62976	4		10 51	26.207	-.053	+10 41	50.65	+0.81		0.727864
65 04 11.11	8861.61073	6		10 47	36.904	-.084	+10 48	10.06	+0.06		0.758104
65 04 14.10	8864.60167	1		10 46	21.990	-.087	+10 47	14.76	+1.08		0.774915
65 04 15.09	8865.59872	3		10 46	02.871	-.085	+10 46	19.84	-0.07		0.780742
65 04 18.09	8868.59007	6		10 45	22.885	-.015	+10 41	57.37	+0.36		0.798836
65 04 22.07	8872.57898	3		10 45	08.972	-.073	+10 32	19.71	+0.58		0.824269
65 04 23.07	8873.57629	8		10 45	12.380	-.077	+10 29	16.27	+0.43		0.830839
65 04 27.06	8877.56584	1		10 45	52.634	-.048	+10 14	34.71	+0.33		0.857868
65 05 01.05	8881.55585	2		10 47	13.780	-.007	+ 9 56	07.03	+0.23		0.885948

JUPITER

65 11 04.34	9068.84635	7		6 03	57.538	-.004	+22 58				4.398621
65 11 06.34	9070.84056	8		6 03	29.027	+0.010	+22 59	05.31	-0.16		4.376084
65 11 10.32	9074.82887	7		6 02	22.255	-.013	+22 59				4.333409
65 11 15.31	9079.81405	3		6 00	41.395	+0.030	+22 59	49.30	-0.81		4.284912
65 11 18.30	9082.80506	9		5 59	31.862	-.076	+23 00				4.258607
65 11 24.28	9088.78686	2		5 56	54.916	+0.010	+23 00	28.47	-0.11		4.212835
65 11 28.27	9092.77459	9		5 54	58.370	+0.032	+23 00	39.83	-0.54		4.187723
65 11 29.27	9093.77151	3		5 54	27.906	+0.015	+23 00	42.35	-0.31		4.182151
65 11 30.26	9094.76843	8		5 53	56.942	-.024	+23 00	44.70	+0.06		4.176867
65 12 01.26	9095.76533	4		5 53	25.562	-.024	+23 00	46.39	+0.09		4.171873
65 12 02.26	9096.76224	3		5 52	53.744	-.029	+23 00	47.75	+0.14		4.167173
65 12 06.24	9100.74980	2		5 50	42.686	-.004	+23 00	48.82	-0.29		4.151340
65 12 08.24	9102.74356	3		5 49	35.203	+0.001	+23 00	47.06	-0.46		4.145232
65 12 20.20	9114.70595	3		5 42	35.223	-.016	+23 00	03.46	-0.27		4.134607
65 12 22.19	9116.69967	2		5 41	24.700	-.024	+22 59	50.53	-0.26		4.137246
65 12 23.19	9117.69654	4		5 40	49.581	-.041	+22 59	43.67	-0.14		4.139041
65 12 29.17	9123.67777	3		5 37	22.834	-.040	+22 58	55.18	-0.88		4.156394
65 12 30.17	9124.67465	7		5 36	49.292	-.018	+22 58	46.59	-0.66		4.160372
66 01 05.15	9130.65603	3		5 33	35.602	-.054	+22 57	50.59	-0.69		4.190560
66 01 12.13	9137.63456	7		5 30	11.018	-.082	+22 56	45.17	-0.28		4.238939
66 01 15.12	9140.62545	9		5 28	51.978	-.041	+22 56				4.263791
66 01 17.11	9142.61942	3		5 28	02.535	-.013	+22 56	01.41	-1.09		4.281670
66 01 18.11	9143.61642	8		5 27	38.823	-.018	+22 55	54.57	-0.17		4.290993
66 01 19.11	9144.61342	7		5 27	15.808	-.029	+22 55	46.90	-0.45		4.300564

SATURN

65 07 22.34	8963.84941	1		23 14	24.187	+0.018	- 7 05	55.20	+1.02		8.974628
65 07 25.34	8966.84092	0		23 13	58.251	+0.034	- 7 09	21.23	+1.41		8.938787
65 07 29.32	8970.82954	1		23 13	19.266	+0.041	- 7 14	22.77	+0.58		8.893895
65 07 31.32	8972.82384	9		23 12	57.906	+0.001	- 7 17	03.03	+1.12		8.872763
65 08 04.31	8976.81238	9		23 12			- 7 22	43.42	+1.39		8.833277
65 08 06.30	8978.80664	1		23 11	47.240	+0.014	- 7 25	42.84	+1.07		8.814971
65 08 07.30	8979.80376	9		23 11	34.574	+0.038	- 7 27	14.88	+0.60		8.806189
65 08 08.30	8980.80088	0		23 11	21.627	+0.027	- 7 28	47.46	+0.91		8.797656
65 08 11.29	8983.79223	3		23 10	41.383	+0.008	- 7 33	33.71	+0.82		8.773587
65 08 12.28	8984.78934	1		23 10	27.543	+0.032	- 7 35	11.42	+0.85		8.766081
65 08 13.28	8985.78644	3		23 10	13.441	+0.011	- 7 36	50.55	+0.55		8.758840
65 08 21.26	8993.76322	7		23 08	13.844	+0.034	- 7 50	34.96	+0.49		8.710674
65 08 30.23	9002.73696	3		23 05			- 8 06	50.32	+0.51		8.678296
65 09 08.21	9011.71063	1		23 03	15.953	-.018	- 8 23	16.50	+0.69		8.670047
65 09 10.20	9013.70478	7		23 02	42.018	-.018	- 8 26	52.48	+1.26		8.671520
65 09 11.20	9014.70185	4		23 02	25.093	-.003	- 8 28	40.66	+0.67		8.672706
65 09 16.18	9019.68723	3		23 01	01.036	+0.009	- 8 37	29.76	+0.40		8.683127
65 09 19.17	9022.67847	9		23 00	11.445	+0.017	- 8 42	37.34	+0.82		8.692952
65 09 20.17	9023.67555	3		22 59	55.105	+0.019	- 8 44	18.68	+0.32		8.696819
65 09 26.15	9029.65806	2		22 58	19.563	-.032	- 8 54	00.62	+0.82		8.726163

SATURN

Date	J.E.D.	O L	Obs. R.A.	(O-C)	L Obs.	Decl.	(O-C)	Distance
	243		h m s	s		° ' "	"	
65 09 27.15	9030.65516	3	22 58 04.219	+0.023	- 8 55	33.32	+0.88	8.732062
65 09 28.15	9031.65225	7	22 57 49.020	+0.049	- 8 57			8.738244
65 10 03.13	9036.63775	2	22 56 35.783	+0.037	- 9 04	18.88	+1.27	8.773301
65 10 04.13	9037.63486	3	22 56 21.725	-0.004	- 9 05	40.84	+1.50	8.781122
65 10 05.13	9038.63197	9	22 56 07.969	+0.031	- 9 07	01.84	+1.04	8.789207
65 10 06.12	9039.62908	4	22 55 54.411	+0.034	- 9 08	20.35	+1.36	8.797552
65 10 07.12	9040.62620	8	22 55 41.091	+0.037	- 9 09	37.59	+1.23	8.806155
65 10 09.12	9042.62044	8	22 55 15.172	+0.024	- 9 12	05.96	+1.72	8.824120

URANUS

65 02 01.30	8792.80939	2	11 02 26.386	-0.046	+ 7 01	42.42	-0.20	17.444412
65 02 04.30	8795.80093	4	11 02 02.674	-0.027	+ 7 04	15.15	+0.12	17.418025
65 02 05.29	8796.79810	1	11 01 54.506	-0.043	+ 7 05	06.85	-0.36	17.409772
65 02 16.26	8807.76696	8	11 00 18.360	-0.048	+ 7 15	16.75	-0.54	17.337684
65 02 20.25	8811.75560	2	10 59 41.015	-0.066	+ 7 19	11.58	-0.24	17.320235
65 02 23.24	8814.74708	6	10 59 12.477	-0.046	+ 7 22	10.50	+0.11	17.310314
65 02 24.24	8815.74424	4	10 59 02.854	-0.067	+ 7 23	10.09	-0.19	17.307618
65 02 27.23	8818.73572	2	10 58 33.866	-0.055	+ 7 26	10.60	-0.18	17.301377
65 02 28.23	8819.73287	6	10 58 24.157	-0.044	+ 7 27	10.63	-0.50	17.299905
65 03 02.22	8821.72719	1	10 58 04.650	-0.056	+ 7 29	11.83	-0.13	17.297906
65 03 11.20	8830.70160	8	10 56 36.962	-0.079	+ 7 38	11.07	-0.59	17.304205
65 03 12.19	8831.69876	2	10 56 27.367	-0.042	+ 7 39	10.30	-0.30	17.306439
65 03 13.19	8832.69592	1	10 56 17.769	-0.044	+ 7 40	08.86	-0.40	17.308973
65 03 14.19	8833.69308	6	10 56 08.220	-0.035	+ 7 41	07.45	-0.17	17.311812
65 03 16.18	8835.68740	2	10 55 49.197	-0.067	+ 7 43	03.00	-0.34	17.318377
65 03 17.18	8836.68456	8	10 55 39.795	-0.043	+ 7 44	00.28	-0.37	17.322102
65 03 23.16	8842.66754	8	10 54 44.558	-0.037	+ 7 49	34.71	-0.21	17.350619
65 03 28.15	8847.65338	6	10 54 00.620	-0.098	+ 7 53	57.96	-0.48	17.382226
66 02 22.26	9178.76343	2	11 17 54.688	-0.031	+ 5 24	43.88	+0.20	17.327711
66 03 07.22	9191.72651	4	11 15 51.238	-0.067	+ 5 37	52.72	+0.51	17.292906
66 03 08.22	9192.72366	7	11 15 41.612	-0.017	+ 5 38	53.53	-0.02	17.292364
66 03 09.22	9193.72082	3	11 15 31.906	-0.042	+ 5 39	54.71	-0.13	17.292125
66 03 10.21	9194.71798	7	11 15 22.259	-0.008	+ 5 40			17.292202
66 03 11.21	9195.71514	8	11 15 12.552	-0.040	+ 5 41			17.292577
66 03 16.20	9200.70093	8	11 14 24.403	-0.043	+ 5 47			17.299059
66 03 17.19	9201.69809	2	11 14 14.861	-0.025	+ 5 48	00.24	+0.04	17.301274
66 03 18.19	9202.69525	4	11 14 05.314	-0.045	+ 5 48	59.40	-0.52	17.303785
66 03 19.19	9203.69241	7	11 13 55.811	-0.056	+ 5 49	59.02	-0.33	17.306597
66 03 20.18	9204.68957	9	11 13 46.397	-0.018	+ 5 50	57.89	-0.56	17.309716
66 03 21.18	9205.68673	2	11 13 36.950	-0.058	+ 5 51	57.52	+0.31	17.313134
66 03 23.18	9207.68106	7	11 13 18.321	-0.026	+ 5 53	53.62	+0.07	17.320869
66 03 25.17	9209.67538	8	11 12 59.897	-0.031	+ 5 55	47.88	-0.22	17.329782
66 03 26.17	9210.67255	2	11 12 50.771	-0.049	+ 5 56	44.60	-0.02	17.334676
66 03 29.16	9213.66404	8	11 12 23.905	-0.059	+ 5 59	30.85	-0.04	17.351087
66 04 01.15	9216.65555	2	11 11 57.825	-0.045	+ 6 02	11.43	-0.41	17.370027
66 04 03.14	9218.64990	3	11 11 40.887	-0.041	+ 6 03	56.19	+0.21	17.384039

NEPTUNE

65 03 31.32	8850.82292	1	15 10 38.531	-0.233	-15 53	53.97	+1.11	29.541902
65 04 01.32	8851.82014	4	15 10 33.874	-0.227	-15 53	32.97	+0.99	29.531010
65 04 05.30	8855.80899	4	15 10 14.335	-0.251	-15 52	05.23	+1.04	29.489818
65 04 10.29	8860.79504	2	15 09 48.232	-0.196	-15 50	09.85	+0.83	29.443943
65 04 14.28	8864.78386	1	15 09 25.984	-0.205	-15 48	32.83	+1.09	29.411911

10 SIX-INCH TRANSIT CIRCLE OBSERVATIONS OF THE SUN, MOON, AND PLANETS

NEPTUNE

Date	J.E.D.	O L	Obs.	R.A.	(O-C)	L Obs.	Decl.	(O-C)	Distance
	243		h m s	s		° ' "	"		
65 04 18.27	8868.77267	6	15 09 02.782	-1.178	-15 46 52.77	+0.99	29.384171		
65 05 05.22	8885.72502	2	15 07 16.510	-1.136	-15 39 24.87	+1.70	29.316708		
65 05 10.21	8890.71100	2	15 06 43.979	-1.221	-15 37 11.74	+1.57	29.312960		
65 05 13.20	8893.70258	6	15 06 24.493	-1.209	-15 35 52.86	+0.94	29.314239		
65 05 14.19	8894.69978	2	15 06 17.992	-1.226	-15 35 26.07	+1.38	29.315246		
65 05 16.19	8896.69417	6	15 06 05.047	-1.246	-15 34 33.99	+1.06	29.318153		
65 05 18.18	8898.68856	3	15 05 52.218	-1.219	-15 33 42.39	+0.77	29.322213		
65 05 19.18	8899.68575	1	15 05 45.806	-1.232	-15 33 16.05	+1.40	29.324671		
65 05 27.16	8907.66333	6	15 04 55.558	-1.221	-15 29 57.04	+0.48	29.354696		
65 05 30.15	8910.65493	6	15 04 37.325	-1.215	-15 28 44.40	+1.36	29.370605		
65 06 04.14	8915.64094	4	15 04 07.950	-1.230	-15 26 50.13	+1.48	29.402596		
65 06 05.13	8916.63814	1	15 04 02.278	-1.193	-15 26 28.45	+1.20	29.409792		
65 06 06.13	8917.63534	6	15 03 56.591	-1.230	-15 26 06.82	+1.15	29.417248		
65 06 07.13	8918.63255	3	15 03 51.040	-1.191	-15 25 45.01	+1.58	29.424971		
65 06 08.12	8919.62975	4	15 03 45.456	-1.249	-15 25 24.16	+1.35	29.432941		
65 06 14.11	8925.61301	2	15 03 13.879	-1.187	-15 23 25.06	+1.08	29.485962		
65 06 23.08	8934.58795	0	15 02 31.762	-1.231	-15 20 52.24	+0.59	29.581219		
65 06 27.07	8938.57684	6	15 02 15.403	-1.238	-15 19 53.98	+1.43	29.629123		
66 04 10.30	9225.80188	3	15 18 44.002	-1.242	-16 26 00.77	+1.11	29.465185		

CERES

65 07 21.40	8962.90505	0	0 30 48.000	-.006	-10 58 29.34	+1.36	2.401653
65 07 22.40	8963.90250	1	0 31 03.650	-.012	-11 01 25.76	+1.25	2.389666
65 07 25.39	8966.89476	0	0 31 43.254	+0.007	-11 11 03.09	+1.78	2.354298
65 07 29.38	8970.88424	1	0 32 18.241	-.017	-11 25 45.34	+1.67	2.308678
65 07 31.37	8972.87889	9	0 32 27.934	-.010	-11 33 53.36	+1.56	2.286603
65 08 03.37	8975.87076	3	0 32 32.502	-.031	-11 47 01.75	+0.93	2.254498
65 08 04.36	8976.86801	9	0 32 31.392	-.013	-11 51 37.79	+1.79	2.244082
65 08 06.36	8978.86248	1	0 32 25.078	-.042	-12 01 12.65	+1.35	2.223697
65 08 08.35	8980.85688	0	0 32 13.471	+0.002	-12 11 12.96	+1.77	2.203935
65 08 11.34	8983.84837	3	0 31 45.836	-.009	-12 27 01.04	+1.73	2.175523
65 08 13.34	8985.84262	3	0 31 20.643	-.015	-12 38 01.91	+1.69	2.157445
65 08 15.33	8987.83681	0	0 30 50.035	-.028	-12 49 23.42	+2.29	2.140094
65 08 21.31	8993.81900	7	0 28 46.160	-.012	-13 25 17.55	+1.52	2.092696
65 08 29.29	9001.79442	9	0 24 49.216	-.020	-14 15 48.66	+2.24	2.041538
65 08 30.29	9002.79128	3	0 24 14.237	-.031	-14 22 13.90	+0.99	2.036195
65 09 08.26	9011.76255	1	0 18 14.206	-.049	-15 18 48.97	+1.15	1.999385
65 09 10.25	9013.75606	7	0 16 44.714	-.014	-15 30 51.21	+1.07	1.994052
65 09 16.23	9019.73640	3	0 12 00.940	-.031	-16 04 52.62	+1.47	1.984483
65 09 19.22	9022.72650	9	0 09 32.809	-.059	-16 20 24.55	+1.32	1.983370
65 09 27.20	9030.70001	3	0 02 50.384	-.003	-16 55 29.68	+2.30	1.992520
65 09 28.19	9031.69670	7	0 02 00.296	-.019	-16 59		1.994898
65 10 03.18	9036.68022	2	23 57 54.671	+0.006	-17 14 37.23	+1.58	2.010799
65 10 04.17	9037.67693	3	23 57 06.832	+0.004	-17 17 07.87	+2.21	2.014768
65 10 05.17	9038.67366	9	23 56 19.520	-.033	-17 19 27.80	+1.63	2.018994
65 10 07.16	9040.66713	8	23 54		-17 23 30.51	+2.04	2.028208
65 10 15.14	9048.64136	8	23 49 06.617	-.032	-17 31 38.18	+1.05	2.074822
65 10 19.12	9052.62873	7	23 46 39.267	+0.005	-17 30 48.79	+1.08	2.103656
65 10 20.12	9053.62561	9	23 46 05.156	+0.003	-17 30 06.12	+1.17	2.111407
65 10 21.12	9054.62250	3	23 45 32.189	+0.019	-17 29 10.89	+1.98	2.119368
65 10 25.11	9058.61019	2	23 43 32.255	-.050	-17 23 34.64	+1.96	2.153236
65 10 26.10	9059.60715	7	23 43 05.461	-.006	-17 21 42.41	+0.97	2.162189
65 10 27.10	9060.60413	3	23 42 39.934	+0.010	-17 19 37.61	+1.13	2.171327
65 10 28.10	9061.60112	8	23 42 15.684	-.019	-17 17 22.12	+0.68	2.180647
65 10 31.09	9064.59218	2	23 41 10.991	-.005	-17 09 26.90	+1.83	2.209648
65 11 02.08	9066.58630	9	23 40 34.584	-.034	-17 03 17.99	+1.04	2.229808

CERES

Date	J.E.D.	O	L	Obs.	R.A.	(O-C)	L	Obs.	Decl.	(O-C)	Distance
	243			h	m	s		°	'	"	
65 11 03.08	9067.58338	2		23	40	18.447		-16	59	57.22	2.240121
65 11 04.08	9068.58048	7		23	40	03.668		-16	56	26.55	2.250586
65 11 05.07	9069.57760	9		23	39	50.269		-16	52	46.50	2.261197
65 11 06.07	9070.57473	8		23	39	38.212		-16	48	55.58	2.271951
65 11 07.07	9071.57187	9		23	39	27.544		-16	44	55.53	2.282842
65 11 10.06	9074.56341	7		23	39	03.841		-16	31	58.64	2.316303
65 11 14.05	9078.55234	7		23	38	51.319		-16	12	38.27	2.362617
65 11 24.02	9088.52576	2		23	39	53.639		-15	14	52.91	2.485421
65 11 29.01	9093.51302	3		23	41	13.082		-14	41	32.29	2.549650
65 12 01.00	9095.50803	4		23	41	53.430		-14	27	28.80	2.575713
65 12 02.00	9096.50555	3		23	42	15.351		-14	20	17.89	2.588810
65 12 19.96	9114.46308	3		23	51	54.122		-11	56	35.13	2.828291
65 12 26.94	9121.44753	8		23	57	03.025		-10	54	34.11	2.921191
65 12 27.94	9122.44535	8		23	57	50.522		-10	45	29.41	2.934353
65 12 28.94	9123.44318	3		23	58	38.804		-10	36	21.51	2.947480

JUNO

65 07 02.30	8943.80668	1		20	53	51.180		- 2	48	36.44	1.923123
65 07 14.26	8955.76896	2		20	46			- 3	14	22.48	1.818584
65 07 20.24	8961.74949	3		20	42	14.525		- 3	37	20.56	1.778747
65 07 21.24	8962.74621	0		20	41	27.164		- 3	41	48.99	1.772974
65 07 22.24	8963.74292	1		20	40	39.079		- 3	46	27.54	1.767455
65 07 27.22	8968.72640	3		20	36	30.413		- 4	12	16.96	1.743744
65 07 31.21	8972.71311	9		20	33	04.815		- 4	35	54.53	1.729545
65 08 03.20	8975.70312	3		20	30	29.169		- 4	55	10.11	1.721717
65 08 06.19	8978.69314	1		20	27	54.074		- 5	15	35.32	1.716305
65 08 08.18	8980.68650	0		20	26	11.728		- 5	29	47.99	1.714034
65 08 10.17	8982.67987	4		20	24	30.797		- 5	44	25.32	1.712823
65 08 11.17	8983.67656	3		20	23	40.926		- 5	51	51.43	1.712613
65 08 12.17	8984.67326	1		20	22	51.658		- 5	59	23.79	1.712665
65 08 13.16	8985.66997	3		20	22	02.888		- 6	07	01.43	1.712977
65 08 24.13	8996.63435	8		20	13	58.688		- 7	34	31.30	1.733107
65 08 28.12	9000.62176	3		20	11	34.031		- 8	07	04.44	1.747658
65 08 29.11	9001.61865	9		20	11	01.065		- 8	15	12.44	1.751858
65 08 30.11	9002.61555	3		20	10	29.508		- 8	23	18.59	1.756276
65 08 31.11	9003.61247	7		20	09	59.250		- 8	31	24.11	1.760908
65 09 04.10	9007.60032	7		20	08	12.976		- 9	03	22.87	1.781487
65 09 07.09	9010.59139	9		20	07	09.089		- 9	26	53.42	1.798960
65 09 11.07	9014.57974	4		20	06	05.842		- 9	57	23.56	1.824765
65 10 03.02	9036.52107	2		20	08	06.961		-12	19		2.006977
65 10 04.01	9037.51862	3		20	08	31.193		-12	24	20.63	2.016459

VESTA

65 10 19.42	9052.92445	2		6	53	38.805		+19	27	44.04	2.152693
65 10 25.41	9058.91023	2		6	56	46.433		+19	27	40.90	2.075592
65 10 26.40	9059.90780	7		6	57	12.447		+19	27	49.64	2.062931
65 10 27.40	9060.90535	3		6	57	36.869		+19	28	01.67	2.050334
65 10 29.40	9062.90040	9		6	58	21.026		+19	28	34.98	2.025347
65 10 30.39	9063.89790	7		6	58	40.699		+19	28	57.39	2.012965
65 10 31.39	9064.89537	2		6	58	58.743		+19	29	22.57	2.000664
65 11 04.38	9068.88509	7		6	59	54.120		+19	31	42.14	1.952328
65 11 05.38	9069.88247	9		7	00	03.700		+19	32	26.08	1.940481
65 11 06.37	9070.87983	8		7	00	11.599		+19	33	14.96	1.928738
65 11 15.35	9079.85515	3		7	00	02.235		+19	43	43.19	1.828315
65 11 18.34	9082.84654	9		6	59	25.917		+19	48		1.797285
65 11 20.34	9084.84069	2		6	58	52.244		+19	52	11.34	1.777390
65 11 24.32	9088.82873	2		6	57	22.246		+20	00	21.82	1.739677
65 11 28.31	9092.81643	9		6	55	22.510		+20	09	44.97	1.705001

VESTA

Date	J.E.D.	O L	Obs.	R.A.	(O-C)	L Obs.	Decl.	(O-C)	Distance
	243		h m s	s		° ' "	"		
65 11 29.31	9093.81330	3	6 54	48.006	+0.119	+20 12	16.70	-0.29	1.696841
65 11 30.31	9094.81015	8	6 54	11.744	+0.129	+20 14	53.54	+0.41	1.688896
65 12 01.30	9095.80698	4	6 53	33.689	+0.111	+20 17	33.65	+0.29	1.681167
65 12 02.30	9096.80379	3	6 52	53.934	+0.121	+20 20	18.54	+0.95	1.673660
65 12 06.29	9100.79084	2	6 49	58.228	+0.120	+20 31	52.64	+0.21	1.645927
65 12 20.24	9114.74347	3	6 36	46.578	+0.116	+21 18	17.20	+0.39	1.580727
65 12 22.23	9116.73652	2	6 34	37.017	+0.156	+21 25	20.76	+0.49	1.575810
65 12 23.23	9117.73303	4	6 33	31.245	+0.127	+21 28	53.50	+0.76	1.573786
65 12 29.21	9123.71200	3	6 26	48.922	+0.108	+21 50	08.30	+0.22	1.567781
65 12 30.20	9124.70849	7	6 25	41.374	+0.129	+21 53	39.47	+0.52	1.567807
66 01 05.18	9130.68749	3	6 19	00.782	+0.113	+22 14	20.92	+0.48	1.574074
66 01 09.17	9134.67360	3	6 14	44.263	+0.118	+22 27	37.64	+0.23	1.583963
66 01 12.16	9137.66329	7	6 11	40.793	+0.119	+22 37	15.50	+0.21	1.594289
66 01 15.15	9140.65310	9	6 08	47.078	+0.107	+22 46	35.09	+0.42	1.607040
66 01 17.14	9142.64637	3	6 06	57.638	+0.131	+22 52	37.41	+0.49	1.616848
66 01 18.14	9143.64303	8	6 06	04.996	+0.143	+22 55	35.56	+0.65	1.622134
66 01 19.13	9144.63971	7	6 05	13.803	+0.126	+22 58	31.45	+0.62	1.627671
66 02 05.08	9161.58631	3	5 55	08.454	+0.124	+23 43			1.755721
66 02 06.08	9162.58336	9	5 54	49.903	+0.141	+23 45	47.55	+0.97	1.764973
66 02 09.07	9165.57467	4	5 54	05.941	+0.113	+23 52	46.65	+0.96	1.793677
66 02 18.04	9174.54979	4	5 53	39.832	+0.124	+24 12	25.67	+0.33	1.887308
66 02 22.03	9178.53931	4	5 54	18.182	+0.128	+24 20	34.43	+0.32	1.931923
66 02 23.03	9179.53675	3	5 54	32.425	+0.107	+24 22	32.82	-0.03	1.943313
66 02 27.02	9183.52669	9	5 55	47.569	+0.101	+24 30	13.41	+0.31	1.989689
66 03 02.01	9186.51936	7	5 57	02.465	+0.111	+24 35	43.44	+0.85	2.025208
66 03 03.01	9187.51696	3	5 57	30.840	+0.114	+24 37	29.52	+0.32	2.037166
66 03 04.01	9188.51458	8	5 58	00.864	+0.113	+24 39	14.80	+0.57	2.049178
66 03 08.00	9192.50523	7	6 00	17.034	+0.109	+24 45	56.97	+0.17	2.097696
66 03 09.00	9193.50293	8	6 00	54.997	+0.123	+24 47	33.21	+0.33	2.109928
66 03 10.99	9195.49840	8	6 02	15.437	+0.104	+24 50			2.134495
66 03 16.98	9201.48521	8	6 06	51.816	+0.131	+24 59	08.06	+0.02	2.208817
66 03 17.98	9202.48307	4	6 07	42.763	+0.129	+25 00	25.55	+0.44	2.221264
66 03 18.98	9203.48094	7	6 08	35.056	+0.127	+25 01	40.00	+0.10	2.233720

MOON

Lun.	Date	J.E.D.	O	L	Obs.	R.A.	(O-C)	L	Obs.	Decl.	(O-C)
		243			h	m	s		°	'	"
520	65 01 12.00	8772.50098	6	1	2 18	16.643	1.282	S	+ 9 45	26.82	+6.73
	65 01 13.03	8773.53625	4	1	3 13	09.596	1.377	S	+14 59	48.22	+6.71
	65 01 15.11	8775.61669	8	1	5 17	11.873	1.552	S	+22 50	35.01	+2.44
	65 01 21.36	8781.86792	2	2	11 43	36.001	1.295	S	+ 7 25	28.53	-8.50
	65 01 22.40	8782.90099	8	2	12 35	18.172	1.229	S	+ 1 38	12.89	-9.21
521	65 02 14.15	8805.65334	6	1	8 08	23.356	1.684	N	+23 23	26.19	-3.94
	65 02 16.23	8807.73674	8	2	10 16	42.118	1.481	N	+15 46	18.14	-8.92
	65 02 20.37	8811.87463	2	2	13 51	34.477	1.261	S	- 7 14	17.15	-9.20
	65 02 23.47	8814.97096	6	2	16 22	29.282	1.272	S	-20 25	40.12	-5.42
522	65 03 10.97	8830.47553	8	1	5 30	12.304	1.510	S	+23 42	42.20	+1.49
	65 03 12.01	8831.51755	2	1	6 34	49.715	1.572	N	+24 54	44.17	-0.59
	65 03 13.06	8832.56041	1	1	7 40	39.260	1.578	N	+24 20	31.27	-3.36
	65 03 14.10	8833.60262	6	1	8 45	32.421	1.460	N	+22 00	29.51	-4.59
	65 03 15.14	8834.64299	4	1	9 47	46.883	1.390	N	+18 08	12.09	-6.64
	65 03 16.18	8835.68101	2	1	10 46	36.967	1.263	N	+13 06	27.23	-7.82
523	65 04 11.05	8861.55438	6	1	9 26	16.948	1.483	N	+19 50	42.24	-6.01
	65 04 13.12	8863.62757	8	1	11 19	50.510	1.228	N	+ 9 52	02.83	-7.96
	65 04 14.16	8864.66133	1	1	12 12	32.034	1.239	N	+ 3 59	00.11	-10.26
	65 04 15.19	8865.69401	3	1	13 03	39.543	1.224	N	- 2 00	54.01	-9.80
	65 04 18.29	8868.79171	6	2	15 36	33.581	1.303	S	-17 40	49.73	-6.76
	65 04 21.39	8871.89517	4	2	18 17	47.020	1.332	N	-25 06	34.29	-0.48
524	65 05 10.04	8890.54206	2	1	11 02	49.333	1.296	N	+11 46	54.85	-8.29
	65 05 13.13	8893.63937	6	1	13 35	09.437	1.185	N	- 5 37	10.39	-7.68
	65 05 14.17	8894.67107	2	1	14 24	52.592	1.184	N	-11 05	15.13	-8.22
	65 05 15.20	8895.70341	3	1	15 15	31.298	1.297	N	-15 57	20.28	-7.67
	65 05 16.23	8896.73672	6	2	16 07	33.696	1.363	S	-19 59	35.62	-6.32
	65 05 18.30	8898.80610	3	2	17 55	37.673	1.343	S	-24 49	35.05	-2.67
	65 05 19.34	8899.84137	1	2	18 50	29.993	1.424	N	-25 23	33.73	+0.20
	65 05 20.37	8900.87622	6	2	19 44	45.402	1.279		-24 42		
525	65 06 08.02	8919.52363	4	1	12 30	32.855	1.209	N	+ 2 01	34.12	-8.44
	65 06 13.18	8924.68388	6	1	16 41	39.176	1.141	N	-22 02	23.16	-1.25
	65 06 14.21	8925.71851	2	2	17 35	35.968	1.364	S	-24 17	58.40	-3.64
	65 06 15.25	8926.75370	3	2	18 30	20.915	1.359	S	-25 19	53.15	-1.06
526	65 07 09.06	8950.56544	8	1	15 33	08.377	1.166	N	-17 28	35.31	-5.34
	65 07 13.20	8954.70243	0	1	19 06	42.598	1.343	S	-25 17	37.01	+1.55
	65 07 14.23	8955.73700	2		20 00			S	-24 13	13.82	+2.06
	65 07 16.30	8957.80266	2	2	21 43	16.238	1.246	N	-18 46	38.58	+5.82
527	65 08 06.01	8978.51309	1	1	16 07	56.937	1.302	N	-20 12	42.60	-4.95
	65 08 07.04	8979.54696	8	1	17 00	47.181	1.292	N	-23 08	28.36	-1.76
	65 08 08.08	8980.58158	0	1	17 54	43.236	1.229		-24 54		
	65 08 10.15	8982.65127	4	1	19 43	13.867	1.272	S	-24 44	00.87	+0.83
	65 08 11.18	8983.68514	3	1	20 36	05.347	1.247	S	-22 49	55.56	+3.51
	65 08 12.21	8984.71778	1	2	21 27	09.211	1.212	S	-19 52	18.92	+5.51
	65 08 13.24	8985.74905	3	2	22 16	15.438	1.208	S	-16 01	22.22	+5.62
	65 08 15.30	8987.80842	0	2	23 49	51.412	1.122		- 6 24		
528	65 09 03.99	9007.49478	7	1	17 35	50.027	1.203		-24 39		
	65 09 07.09	9010.59913	9	1	20 18	20.085	1.266	S	-23 43	46.43	+2.68
	65 09 10.19	9013.69454	7	1	22 47	56.367	1.127	S	-13 02	20.45	+7.45
	65 09 11.22	9014.72423	4	2	23 34	44.683	1.124	S	- 8 02	24.84	+7.33
	65 09 16.37	9019.87935	3	2	3 38	26.877	1.235	N	+18 29	27.72	+5.60
529	65 10 02.97	9036.47697	2	1	19 04	26.970	1.265	S	-25 47	19.87	+1.14
	65 10 04.01	9037.51173	3	1	19 58	35.311	1.116	S	-24 39	52.58	+1.69
	65 10 06.07	9039.57752	4	1	21 41	28.277	1.129	S	-19 03	34.43	+6.07
	65 10 07.10	9040.60847	8	1	22 30	06.117	1.236	S	-14 53	24.11	+6.70
	65 10 09.16	9042.66798	8	1	0 03	54.804	1.107	S	- 4 41	25.49	+7.58
	65 10 15.36	9048.86922	7	2	5 18	09.620	1.457	N	+24 26	49.52	+1.33

14 SIX-INCH TRANSIT CIRCLE OBSERVATIONS OF THE SUN, MOON, AND PLANETS

MOON

Lun.	Date	J.E.D.	O	L	Obs.	R.A.	(O-C)	L	Obs.	Decl.	(O-C)
		243			h m s	s			° ' "	"	
530	65 10 30.92	9064.42275	8	1	19 36	33.482	1.320	S	-25 27	35.58	+1.51
	65 11 01.99	9066.48983	9	1	21 21	18.400	1.204	S	-20 41	12.23	+4.44
	65 11 03.02	9067.52112	8	1	22 10	25.153	1.103	S	-16 50	48.83	+5.98
	65 11 04.05	9068.55123	7	1	22 57	50.492	1.113	S	-12 15	53.50	+7.47
	65 11 05.08	9069.58067	9	1	23 44	17.597	1.062	S	-7 06	27.75	+6.65
	65 11 06.11	9070.61006	8	1	0 30	40.448	1.098	S	-1 32	49.14	+7.79
	65 11 07.14	9071.64010	9	1	1 17	59.709	1.123	S	+4 13	14.30	+8.58
	65 11 10.24	9074.74138	7	2	3 56	04.477	1.466	N	+20 03	29.88	+5.04
	65 11 15.44	9079.94805	3	2	9 14	12.152	1.536	S	+21 12	22.52	-6.31
531	65 11 29.93	9094.43344	8	1	21 50	16.423	1.198	S	-18 35	50.73	+5.49
	65 12 01.99	9096.49300	3	1	23 24	09.229	1.108	S	-9 27	26.98	+7.73
	65 12 06.11	9100.61361	2	1	2 34	04.491	1.172	S	+12 48	22.73	+7.38
	65 12 08.18	9102.68708	3	1	4 28	03.696	1.483		+22 08		
532	65 12 29.93	9124.43495	7	1	23 50	43.840	1.058	S	-6 17	01.62	+8.81
	65 12 30.96	9125.46328	4	1	0 35	34.164	1.010	S	-0 52	06.84	+6.68
	66 01 04.09	9129.59152	4		3 56			S	+20 08	42.38	+5.49
	66 01 07.21	9132.71960	8	2	7 13	17.420	1.736	N	+25 52	57.80	-2.13
	66 01 09.30	9134.80757	3	2	9 28	11.876	1.601	S	+20 08	15.16	-8.59
	66 01 12.41	9137.91865	4	2	12 20	25.537	1.271	S	+2 37	49.54	-10.64
	66 01 15.51	9141.01679	7		14 53			S	-14 57	25.19	-7.53
534	66 03 02.02	9186.52460	7	1	6 04	37.208	1.449	N	+26 07	48.75	+1.53
	66 03 03.06	9187.56750	3	1	7 10	30.534	1.617		+26 10		
	66 03 04.11	9188.61111	8	1	8 17	25.340	1.621	N	+24 16	12.49	-4.39
	66 03 07.23	9191.73288	4	2	11 25	04.715	1.515	N	+8 53	27.13	-8.93
	66 03 08.26	9192.76941	7	2	12 21	46.387	1.446	S	+2 04	10.50	-10.56
	66 03 09.30	9193.80476	3	2	13 16	45.728	1.346	S	-4 43	57.62	-9.26
	66 03 11.37	9195.87482	8	2	15 05	48.350	1.395		-16 36		
535	66 03 29.97	9214.47673	7	1	6 45	53.570	1.521		+26 36		
	66 04 01.06	9216.56030	2	1	8 54	27.413	1.566	N	+22 33	20.24	-5.33
	66 04 03.13	9218.63869	3	1	10 55	31.453	1.419	N	+12 15	23.48	-10.26
	66 04 10.39	9225.89306	3	2	17 30	25.074	1.476		-25 40		
	66 04 11.43	9226.93072	4	2	18 28	44.179	1.461		-26 40		

UNITED STATES NAVAL OBSERVATORY

CORRECTION

CIRCULAR NO. 116

UNITED STATES NAVAL OBSERVATORY CIRCULAR NO. 108

U. S. Naval Observatory, Washington, D. C. 20390

January 29, 1967

OBSERVATIONS OF THE SUN, MOON, AND PLANETS

SIX-INCH TRANSIT CIRCLE RESULTS

Total Solar Eclipse of 22 September 1968

Page
5

line 22	Obs.Decl.	for	°	'	"	read	°	'	"
	(O-C)	for	-10	49	47.71		-10	49	49.34
					+1.29	read			-0.34

Issue 3, December

REVISED EDITION

This Circular contains revised



